solution used. As this work progresses, accounts of it will appear in the ELEMENTARY SCHOOL TEACHER AND COURSE OF STUDY.

Nature study.— Weather maps, recording temperature, winds, rainfall, etc., are being kept. They will help the children in understanding the climate and climatic changes in the parts of the world about which we study.

Number.— The number work, up to the present, has been largely to ascertain the abilities of the pupils, and to give individual help to those in need of it. Drill in the processes involved in percentage has also been given, to enable the children to handle the problems that they meet with in their other work.

Manual training and clay-modeling.— The manual training and clay-work has consisted entirely of the making of Christmas gifts.

EIGHTH GRADE.

KATHARINE M. STILWELL.

REVIEW FOR NOVEMBER.

MATHEMATICS.

THE mathematics in the eighth grade during November consisted in measuring and making drawings to scale of the school-room walls. These drawings are to furnish a basis for the decorative designs to be put upon the walls.

The following plan for teaching was prepared and the work was carried out by Miss Agnes M. Tuttle, a member of the first-year pedagogic class. In teaching, Miss Tuttle has not been able to accomplish all the work planned, as the measurement of the inaccessible distances proved to be a difficult problem for the class and required much time. However, the pupils succeeded in solving it. The work will be continued and the drawings made under the direction of the regular teacher.

MOTIVE.

The motive of this plan is to supply mathematical data for use in the decoration of the class-room.

APPARATUS AND MATERIAL.

Paper, pencil, ruler, tape, meter or yardstick, plane-table, alidade, plumb-line, flagpoles, T-square, thumb-tacks, ink, drawing pen, cross-staff or bar.

The plane-table consists of a flat-topped camera tripod, to the top of which a light drawing board is screwed. The alidade is made of a foot-rule

carrying two needles or pins for sights (see Fig. 7, COURSE OF STUDY, Vol. I, No. 6, p. 667). The cross-staff consists of a light stick about three feet long (a meter or yardstick), carrying a nail-sight at one end (the eye end) and provided with another stick, which, held at right angles to the first, slides easily back and forth along it. The cross-stick should be supplied with three or five sights (*S 1*, *S 2*, etc., Fig. 1), one at each end and a third in the middle. The cross-bars should be at least two feet long.

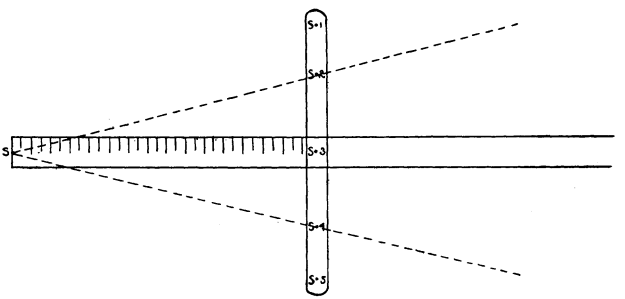


FIG. 1.

A simple instrument for measuring vertical angles may be made by fastening to an upright seven or eight feet high a meter or yardstick approximately at right angles, and suspending over the meterstick a continuous plumbline, equipped with three sliding beads and a bob at each end. To avoid vibrations, the bobs may hang in pails of water.

METHOD.

Discussion: Talk with the children about decorating the walls of the room. Are the walls beautiful in their present condition? What shall be done to beautify them? The children may suggest hanging paper, tinting the walls, decorative painting, etc. Is the decorative painting done in designs by the use of set patterns? Children may suggest the use of stencils in applying the designs to the wall.

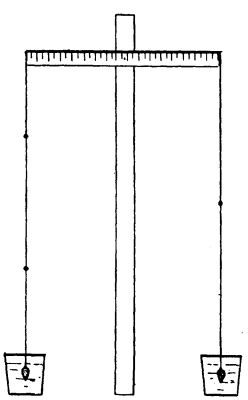
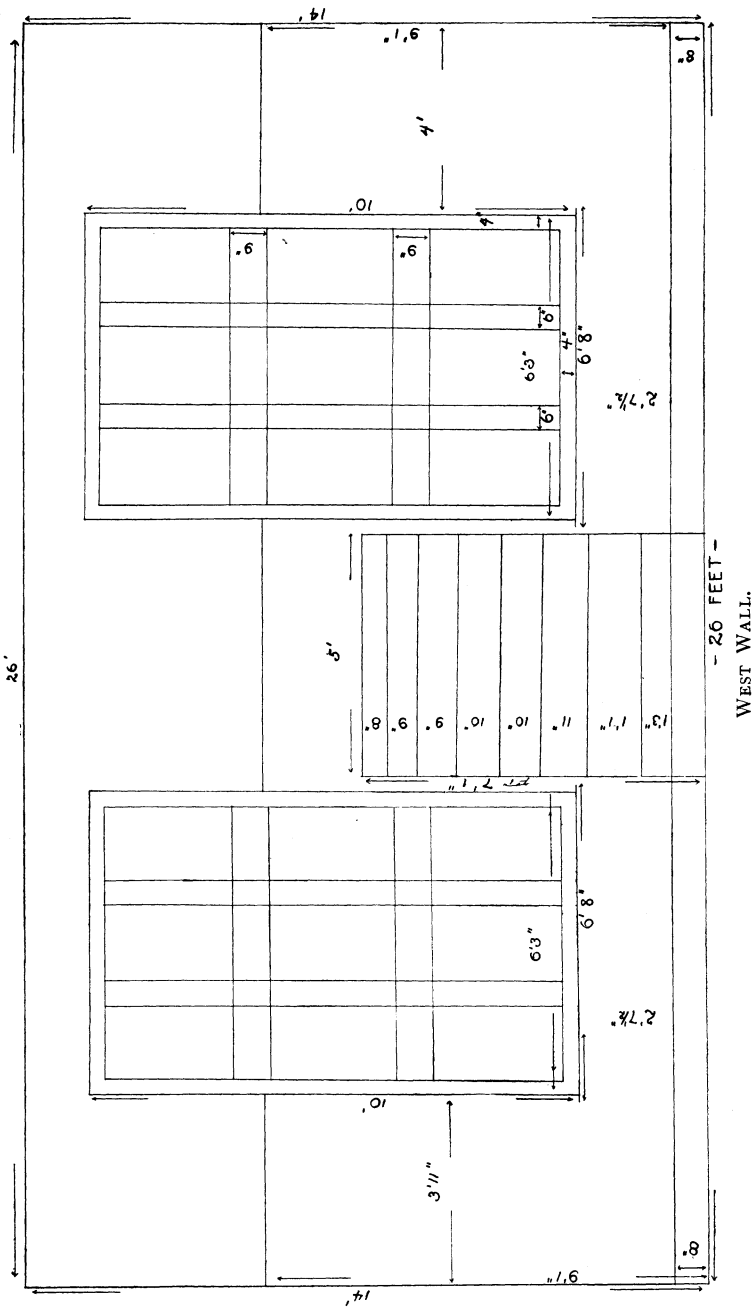


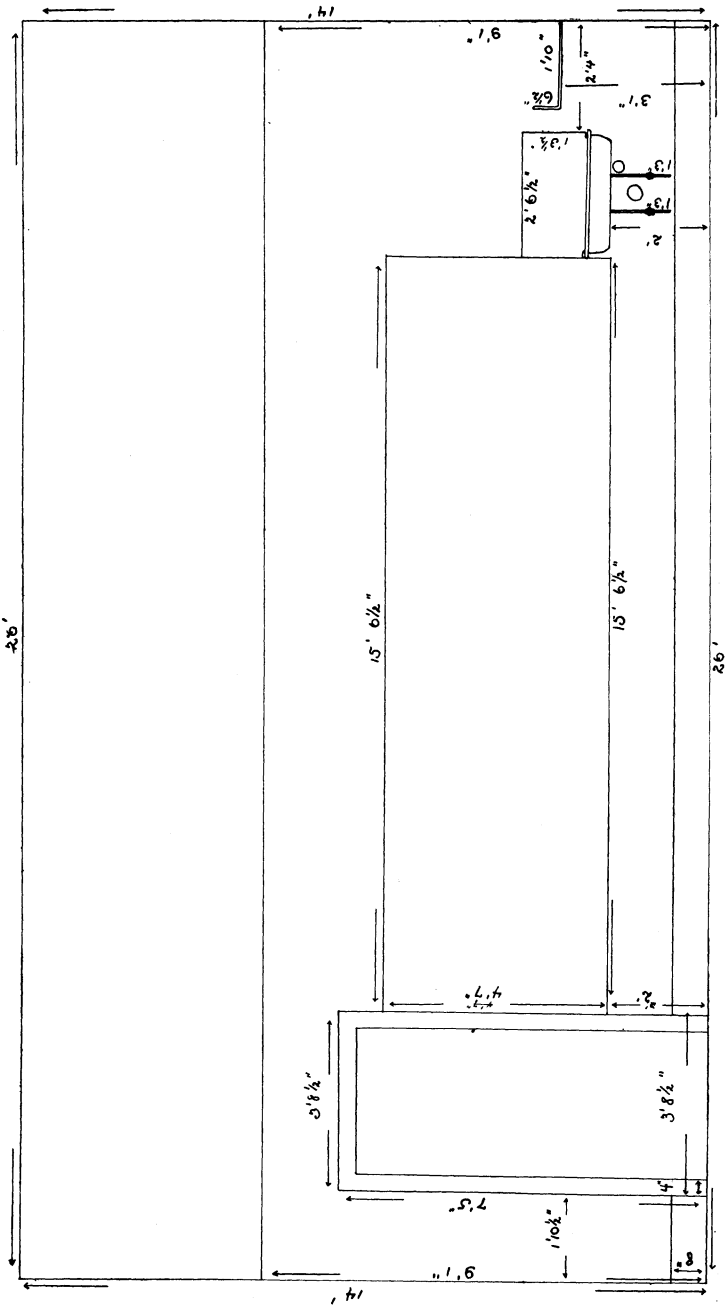
FIG. 2.

How does the designer determine the size and proportions of his designs? Why is it necessary for him to know the dimensions of the walls and of the openings, windows, etc., in the walls, in order to plan his designs? After the designer has the measurements, can he determine the proper size for his stencils and the number of times he wishes to apply the portions of his designs to the walls?

How shall we keep a record of the data? Why not write a list of the measurements and a description of the magnitudes measured? Or shall we draw plans of the walls on a smaller scale and record the data on these plans?

How shall we begin the work?—Discussion: What materials are needed


14'
1'6"
8"
4'
10'
4"
9"
9"
6"
6'3"
4"
6'8"
2'7½"
6"
5'
8"
9"
9"
10"
10"
11"
1'1"
1'3"
1'1½"
26'
- 26 FEET -
WEST WALL.
6'3"
6'8"
2'7½"
10'
3'11"
8"
1'6"
14'


14'
9'1"
1'10"
2'4"
6½"
3'1"
1'3½"
2'6½"
1'3"
1'3"
2'
15' 6½"
15' 6½"
25'
26'
4'7"
2'
3'8½"
3'8½"
4"
7'5"
1'10½"
9'1"
14'

EAST WALL.

for our work? Children will suggest the meterstick and the tape. How shall we record our data while making all measurements? Children will probably suggest making a hasty sketch of the plans of the walls, on which to write the results of our measurements. Before beginning the measurements, the children will estimate the magnitudes to be measured, such as the length and height of the walls, the height and width of the windows and doors, the width and length of the blackboard, height of picture molding from the floor, etc. Write these estimates in a list for comparison with the true measurements.

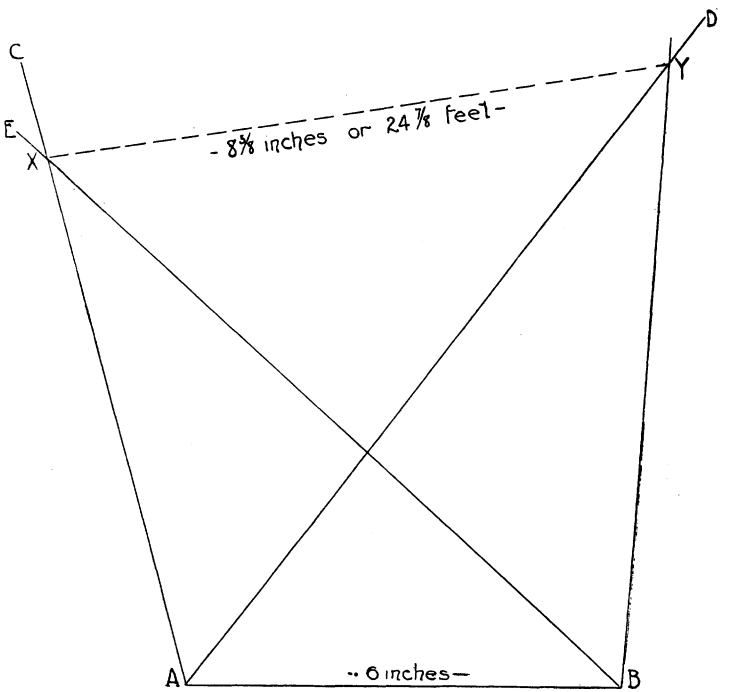
Measure accessible distances. — Discussion: With what magnitudes shall we begin our measurements? The most accessible ones. The children will be divided into groups of two for the practical work. Two children measure length of east wall, width of baseboard, distance from corner to door, width of door, length of lower edge of blackboard, and distance from lower corners of blackboard to the floor. Two children measure height of door at each side, width of door at the top, width of doorcase, height of blackboard at each end, and length of blackboard at the top. Two children take all the measurements of the lavatory, its height from the floor, distance from it to the corner, and the measurements for locating the pipe. Two children measure the length of the west wall, width of the baseboard, distance of one window from the floor at each end of the window-sill, distance from the corner of the room to the window, width of the window, and the length of the window-sill. Two children measure the distance from window to window, width and height of the case of shelves, and distance between the shelves. Two children measure the distance of the other window from the floor and from the corner of the room, width of window, length of window-sill, and the width of both window-frames and the parts of the window-sashes, needed to represent the windows in the plot.

Measure the inaccessible distances. — Discussion: Can any child suggest a way of measuring the length of the wall at the ceiling? If a practicable way is suggested, use it. If not, tell the children that it can be done with the plane-table and alidade. Show how to use the appliances.

With thumbtacks pin a sheet of paper on the drawing board. Place the plane-table so that the alidade points toward one end of the line to be measured. Sight along the top of the board, and bring the plane of the board into the plane of the line to be measured by adjusting the lengths and positions of the tripod legs. Sight along the alidade to the end of the line to be measured, or upper corner of the room. Draw the line $A\ C$, Fig. 3, on the paper along the alidade. This line will represent an imaginary line from the eye to the corner. Keeping the end of the alidade nearest your eye, on the same point (A), swing the other end of the alidade around so that it is sighted into line with the other upper corner. Draw the line $A\ D$ on the paper along the alidade. This line will represent an imaginary line from the eye to the other end of the line to be measured. By means of a plumbline mark on the

floor the point underneath the center of the board. Move the plane-table to a position from which the other upper corner of the room may be seen.

By means of a plumbline mark again on the floor the point underneath the center of the board. Measure the distance from this point to the point underneath the center of the board in its former position. Draw a line (*A B*) on paper, to any convenient scale, representing this distance. Place the alidade with the end at this point (*B*), which represents the point underneath the center



Scale 1″ = 3′.

FIG. 3.

of the table. Now, sight along the alidade, and direct it first toward one end of the line to be measured, and then toward the other end. Draw lines *B E* and *B F* on the board to represent imaginary lines from the eye, in this new position, to the ends of the line being measured. The points where these lines intersect the lines already drawn will represent the ends of the length of the wall to be measured.

Measure the distance between the intersections to ascertain the length of the line *X Y*, representing the length of the wall to be found. This line will be on the same scale as the line *A B*. (In my figure, *A B* is 6 inches, allowing 3 feet to the inch, and *X Y* is 8⅝ inches; hence the

length of the wall at the ceiling is $3 \times 8\frac{5}{8} = 25\frac{7}{8}$, or $25\frac{7}{8}$ feet. In these measurements the crude instruments cannot furnish more than rough approximate values. Since the carpenters use plumblines and other instruments with quite as great a degree of accuracy in construction as my method of measuring secures, I discarded, in my own plot, the $\frac{1}{8}$ of an inch discrepancy, and drew my line, representing the upper edge of the wall, as 26 inches, which is the same as the lower one.)

Each pupil should perform this experiment to become quite familiar with the method of measuring such measures, and to realize that he must be careful to draw the lines correctly and to make the intersections definite by using a hard pencil sharpened to a fine point.

Measure the height of the walls.— If no one suggests a way of measuring the height of the walls and the height of the windows, I shall explain the use of the cross-staff (Fig. 1). To ascertain the height of the wall, I stood at a distance of 27 feet, or 324 inches, from the corner of the room. Sliding the cross-stick along the meterstick, I sighted so that one nail-sight (S 2) was in line with the upper corner of the wall, and another (S 4) in line with the lower corner. The cross-stick stood at 21 inches. Since the nail-sights (S 2, S 4) were 11 inches apart, I had this proportion: $21 : 11 = 324 : x$; $21x = 3{,}564$; $x = 169\frac{5}{7}$ inches, or 14 feet $1\frac{5}{7}$ inches, the height of wall. This will be developed by questions in the class. Imagine lines drawn from the eye to those corners. These lines, with the height of the wall, form an isosceles triangle. The distance from the eye to the corner of the room is the perpendicular of the triangle. Draw to a convenient scale a triangle whose sides shall represent the distances from the eye to the top and the bottom of the wall and to the height of the wall. Lead the pupil to see that $21 : 11 = 324 : x$.

MORNING EXERCISES.

BERTHA PAYNE.

		LEADER.
January 2.	Songs	Miss Payne
3.	Current Events	Miss Rice
7.	Gymnastic Practice Order	Mr. Kroh
8.	Stories from Ulysses	Mrs. Thorne-Thomsen
9.	French Games	Miss Ashleman
10.	Stories of Shepherd Life	Miss Mitchell
14.	Birds	Mr. Flint
15.	Types of Courage	Miss Van Hoesen
16.	Nonsense in Literature	Miss Warren
17.	Time	Mr. George W. Myers
21.	Cereals	Mrs. Norton
22.	History Stories	Miss Curtis